Wisconsin’s Forest Industry:
Rooted in our Lives
Rooted in our Economy

Wisconsin Department of Natural Resources
Forestry Division, Forest Products Services
Wisconsin forest industry overview

Industry sectors and trends

Emerging markets
Part I: Forest Industry Overview
Wisconsin’s forest industry

- ~1,200 establishments
- Over 60,000 jobs
- $24.1 billion in goods and services annually
- Approximately 14% of manufacturing jobs
Wisconsin’s forest industry (cont’d)

- Exports total over $2.2 billion annually
- Top employer in 10 counties
- Supports employment of over 111,000 additional jobs
Why should we care?

- The health of Wisconsin’s economy depends upon the health of Wisconsin’s forest industry
- The health of Wisconsin’s forests depends upon the health of Wisconsin’s forest industry
Why should we care?

- We as consumers depend on forests!

<table>
<thead>
<tr>
<th>Flooring</th>
<th>Baseball bats</th>
<th>Houses</th>
<th>Ice cream thickener</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber</td>
<td>Garden stakes</td>
<td>Furniture</td>
<td>Toilet paper</td>
</tr>
<tr>
<td>Pressboard</td>
<td>Charcoal</td>
<td>Crafts</td>
<td>Broom sticks</td>
</tr>
<tr>
<td>Veneer</td>
<td>Bowling pins</td>
<td>Roofs</td>
<td>Imitation bacon</td>
</tr>
<tr>
<td>Plywood</td>
<td>Toys</td>
<td>Stairways</td>
<td>Candy wrappers</td>
</tr>
<tr>
<td>Dowels</td>
<td>Signs</td>
<td>Cider</td>
<td>Fruit</td>
</tr>
<tr>
<td>Paper</td>
<td>Syrup</td>
<td>Vitamins</td>
<td>Cutting boards</td>
</tr>
<tr>
<td>Paneling</td>
<td>Pallets</td>
<td>Cooking utensils</td>
<td>Desks</td>
</tr>
<tr>
<td>Windows</td>
<td>Cardboard</td>
<td>Pencils</td>
<td>Food packaging</td>
</tr>
<tr>
<td>Doors</td>
<td>Grocery bags</td>
<td>Shampoo</td>
<td>Toilet seats</td>
</tr>
<tr>
<td>Railroad ties</td>
<td>Chewing gum</td>
<td>Oars</td>
<td>Toothpaste</td>
</tr>
<tr>
<td>Energy</td>
<td>Paper towels</td>
<td>Coffee filters</td>
<td>Nuts</td>
</tr>
<tr>
<td>Firewood</td>
<td>Oil spill agents</td>
<td>Toothpicks</td>
<td>Magazines</td>
</tr>
<tr>
<td>Christmas trees</td>
<td>Hockey sticks</td>
<td>Diapers</td>
<td>Golf tees</td>
</tr>
<tr>
<td>Tool handles</td>
<td>Liquid smoke</td>
<td>Sponges</td>
<td>Nail polish</td>
</tr>
<tr>
<td>Animal bedding</td>
<td>Cosmetics</td>
<td>Mulch</td>
<td>Wood pellets</td>
</tr>
<tr>
<td>Fence posts</td>
<td>Baby foods</td>
<td>Postage stamps</td>
<td>AND MORE!</td>
</tr>
</tbody>
</table>
Can Wisconsin’s forests support these uses?

- About half of Wisconsin is covered by forests totaling 17.1 million acres.
  - 574 million cubic feet of wood grows annually.
  - 300 million cubic feet is harvested annually.
- This is almost twice as much volume growth than what is harvested.
What is harvested from WI forests?

<table>
<thead>
<tr>
<th>Veneer logs</th>
<th>Saw logs</th>
<th>Bolts</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Veneer logs" /></td>
<td><img src="image2" alt="Saw logs" /></td>
<td><img src="image3" alt="Bolts" /></td>
</tr>
<tr>
<td>Pulpwood</td>
<td>Specialty logs</td>
<td>Biomass</td>
</tr>
<tr>
<td><img src="image4" alt="Pulpwood" /></td>
<td><img src="image5" alt="Specialty logs" /></td>
<td><img src="image6" alt="Biomass" /></td>
</tr>
</tbody>
</table>
What is harvested from WI forests?

- 65% Pulpwood
- 30% Saw logs
- 3% Veneer logs
- 2% Other

2013 Wisconsin Timber Product Output Survey
Timber trade patterns

- 85% of the timber harvested in Wisconsin is used by Wisconsin manufacturers
- 7% of the timber harvested goes to Michigan
- Remainder goes to Minnesota and other states
Forest product industry locations

Primary Forest Industries*
- Pulp Mill
- Sawmill
- Pellet
- Veneer
- Biomass Conversion
- Other Primary Industry
- Secondary Forest Industry
<table>
<thead>
<tr>
<th>Primary Mill Type</th>
<th>2003</th>
<th>2008</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawmills</td>
<td>227</td>
<td>179</td>
<td>205</td>
</tr>
<tr>
<td>Veneer mills</td>
<td>9</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Pulp mills</td>
<td>13</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Composite mills</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Other mills</td>
<td>21</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td><strong>ALL MILLS</strong></td>
<td><strong>275</strong></td>
<td><strong>227</strong></td>
<td><strong>238</strong></td>
</tr>
</tbody>
</table>

Another 1000+ companies in forestry/logging, secondary wood and paper manufacturing
Employment

60,000+ employees in a diverse forest industry
<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Converted paper manufacturing</td>
<td>18,957</td>
</tr>
<tr>
<td>Wood furniture manufacturing</td>
<td>15,397</td>
</tr>
<tr>
<td>Wood product manufacturing</td>
<td>12,519</td>
</tr>
<tr>
<td>Pulp and paper mills</td>
<td>11,370</td>
</tr>
<tr>
<td>Plywood and engineered wood mills</td>
<td>2,921</td>
</tr>
<tr>
<td>Sawmills and wood preservation</td>
<td>2,226</td>
</tr>
<tr>
<td>Logging</td>
<td>767</td>
</tr>
<tr>
<td>Support activities for forestry</td>
<td>141</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>64,298</strong></td>
</tr>
</tbody>
</table>
Wood and Paper Manufacturing Employment Trends

- Paper Manufacturing
- Paper Mills
- Wood Furniture Manufacturing
- Wood Product Manufacturing

Yearly employment trends from 2006 to 2016.
Careers in forest products

- Forester
- Logger
- Equipment operator
- Truck driver
- Lumber inspector
- Dry kiln operator
- Electrician
- Sales representative
- Chemical engineer
- Administration
- Assembler
- Paper chemist
- IT support
- Packaging engineer
- Process engineer
- Quality control specialist
- Accountant
- Millwright
- Maintenance technician
Part II: Forest Industry Sectors
Forestry/logging

- Mechanized logging
- Chainsaw logging
- Highly-skilled profession
  - Equipment maintenance
  - Forest road construction and maintenance
  - Truck driving and hauling
  - Forestry, accounting/finance
Sawmills

Sawmill systems

Portable
- Mobile
- Custom products or services

Value Recovery
- High value
- Multiple passes
- Mixed products

Production
- High production
- Few passes
- Dimension products
Sawmills

Lumber products and their uses

- High grade hardwood lumber
  - Millwork, fine furniture
  - Cabinets, flooring

- Softwood lumber
  - Structural framing lumber
  - Timbers, beams, posts and poles
  - Paneling

- Industrial hardwood and softwood lumber
  - Railroad ties
  - Pallets and crating
  - Crane mats
Sawmills

- Technology-driven
  - Computer controlled
  - Optimizing equipment
  - Scanning/tally systems

- Increasing importance of exports

- By-products marketed for many uses
  - “Everything gets used but the tree’s shadow”
Pulp/paper industry
Wisconsin pulp/paper industry

Wisconsin has been the number one papermaking state in the US for over 60 years.

The pulp and paper industry serves diverse markets/uses, majority of the industry is stable:

- Printing & writing
- Packaging
- Hygienic papers
- Specialty
Wisconsin pulp/paper industry

- Mill closures and consolidations the last 20 years with adoption of digital media/electronics
- However, industry continues to adapt to stable, growing, or value-added markets along with efficiency measures
- Investments in paper packaging and specialty
  - Appleton, WI
  - Green Bay, WI
  - Marshfield, WI
  - Rhinelander, WI
  - Wisconsin Rapids, WI
Small diameter wood—beyond paper

- Engineered wood products
- Composite siding
- Firewood
- Shavings
- Excelsior
- Posts
- Pellets
Engineered wood products

- Effective utilization of small diameter/low quality trees
- Oriented strand board panels
- Plywood
- Structural glued-laminated beams
- Non-structural panels (MDF/HDF)
- Engineered composite siding
Secondary wood manufacturers

- Windows and doors
- Flooring (residential and sports floors)
- Cabinetry
- Architectural millwork
- Fine furniture
- Sporting goods
- Toys
- Stairs
- Cheese boxes
- Sports goods
- Crafts
- Kitchen utensils
Biomass industry

- Bark: mulch, boiler fuel
- Slabs and end cuts: boiler fuel, firewood, paper chips
- Sawdust:
  - Wood pellets
  - Liquid smoke
  - Animal bedding
  - Wood-plastic composites
  - Activated carbon/bio-char
Wood energy

- Wood is a locally-sourced fuel
- Electricity, heating, or combined heat & power (CHP)
- Many forest industries utilize wood by-products for energy
- Benefits beyond cost
- Impact of competing fuels

<table>
<thead>
<tr>
<th>Fuel, unit</th>
<th>40% moisture Wood Chips, ton</th>
<th>Seasoned Cord Wood, cord</th>
<th>Natural Gas, mcf</th>
<th>Wood Pellets, ton</th>
<th>Propane, gallon</th>
<th>Fuel Oil, gallon</th>
<th>Electricity, kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>mmBtu/unit</td>
<td>10</td>
<td>20</td>
<td>1</td>
<td>16</td>
<td>0.09</td>
<td>0.14</td>
<td>0.003412</td>
</tr>
<tr>
<td>Cost/unit</td>
<td>$40.00</td>
<td>$120.00</td>
<td>$7.00</td>
<td>$220.00</td>
<td>$2.00</td>
<td>$3.25</td>
<td>$0.12</td>
</tr>
<tr>
<td>Cost/mmBtu</td>
<td>$4.00</td>
<td>$6.00</td>
<td>$7.00</td>
<td>$13.75</td>
<td>$22.22</td>
<td>$23.21</td>
<td>$35.17</td>
</tr>
</tbody>
</table>
Part III: Emerging Forest Markets
Emerging forest products

Mass timber
- Glued-laminated timber (glulam)
- Cross-laminated timber (CLT)
- Nail-laminated timber (NLT)

Laminated panels

Timber bridges
Emerging forest products

Thermally-modified wood

- Chemical-free process that modifies wood cell walls by using heat and removing oxygen

- Applications
  - Siding
  - Decking
  - Windows
Emerging forest products

- Bio-based chemicals from wood
  - Nanocellulose
  - Biofuels

Source: AST Wausau
In summary

- Managed forests provide numerous ecological, social, and economic benefits in our lives.

- The forest industry extends across the entire state of Wisconsin and continues to serve our growing demand for forest products.

- Employment opportunities in the forest industry range from positions in forest management, logging, manufacturing, trades, engineering, management and sales.
Questions?
Brought to you by:

Forest Products Services
Wisconsin Department of Natural Resources
Division of Forestry

www.dnr.wi.gov, keyword “forest products”